

AN AIRBORNE EVALUATING EQUIPMENT STUDY

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This report was prepared by Planning Research Corporation under Contract No. NAS 8-20367, "An Airborne Evaluating Equipment Study," for the George C. Marshall Space Flight Center of the National Aeronautics and Space Administration. The work was administered under the technical direction of Quality and Reliability Assurance Laboratory, George C. Marshall Space Flight Center with Walter Mitchell acting as project manager.

PROGRESS DURING REPORTING PERIOD

Work during the reporting period was centered in four major areas:

System Implications of Boeing AEE Concept

Work continued on the determination of system software elements required to implement the Boeing concept for the Apollo Applications Program. In addition to the topics of investigation reported last month (Ref. D-1236, "An Airborne Evaluating Equipment Study - Monthly Progress Report" dated 22 June 1966) creative work is focused on defining the new software and the modifications to current software required to implement this concept. This investigation includes the three software areas: on-board checkout system, ground checkout system, and support system. As before, work is also focused on the capability of the Boeing concept to provide required displays and control for the checkout personnel. .

Alternate AEE Hardware Approaches

Work continued to determine, at the conceptual design level, optimized on-board checkout systems employing digital computer control. Both centralized and decentralized system concepts are being explored. A survey and analysis of computers potentially suitable for AEE/OCS implementation was completed and reported in D-1237, "A Survey of Spaceborne Computers". Additional investigation was directed to on-board data acquisition techniques and efficient (in terms of vehicle weight) techniques of stimulus generation. For on-orbit experiment checkout, it has been determined that a combination of special purpose stimuli built into the experiment equipment and limited capability, but frequently used stimuli, e. g., discretes, offers the least-weight solution. A brief review was made of past analytical and experimental results on space checkout applications of passive instrumentation.

Test Information Flow

Work on this task was started late in the reporting period; it is focused initially on documenting the current information flow from test engineer

to operating program for the S-IV B and IU. The types and quantities of information flow were partially described. A limited determination was made of the necessary modifications to this flow to accommodate the Boeing concept. Also, an initial look was taken at the potential use of test-oriented languages; this is part of an attempt to find the most efficient potential implementation of the Boeing system.

Anticipated Work

Work during the forthcoming reporting period will include:

1. Verbal presentation of system implications of Boeing concept.
2. Further definition of alternate AEE/OCS systems:
 - a. preliminary analysis of application of passive instrumentation techniques to the S-IV B stage and experiments.
 - b. determination of preferred on-board data acquisition technique.
 - c. determination of total vehicle implications of alternate organizations of on-board control.
3. Initiation of analysis of software required to implement the alternate AEE/OCS systems:
 - a. determination of areas of possible hardware-software tradeoff in implementation of alternate systems.
4. Initiation of work to determine the total system (hardware and software) cost implications of the Boeing concept.
5. Additional information acquisition by visit to NASA-KSC.
6. Continuation of investigation of information flow for Boeing concept and determination of potential use of test languages.

PROBLEM AREAS

The major persistent problem is the determination of test requirements for the AAP experiments. Much documentation has been acquired describing the potential experiments and their design. Unfortunately, however, these documents are inadequate in the area of test requirements. On-orbit test objectives and techniques for the S-IV B and IU are also only generally documented. To overcome these difficulties, within the

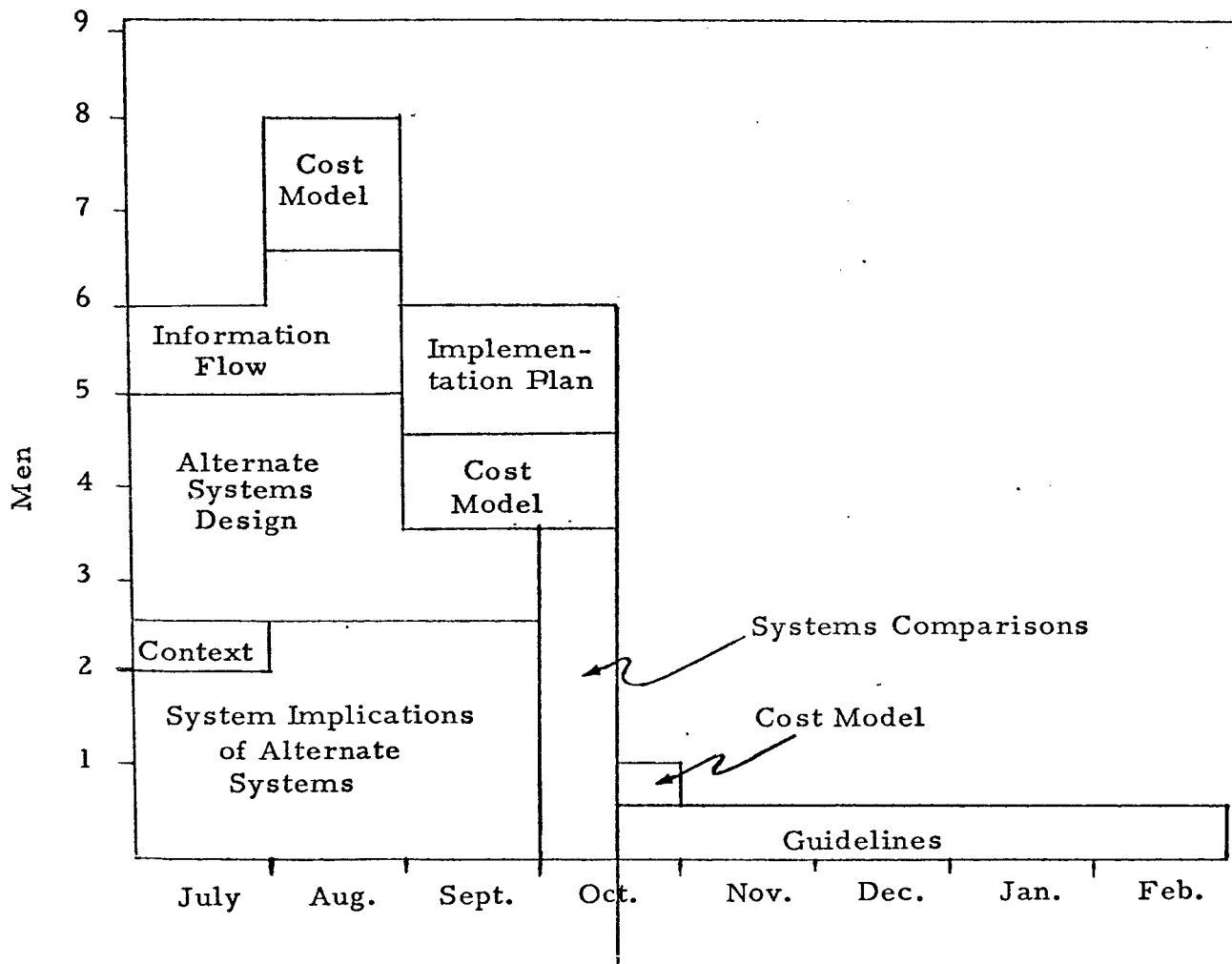
time and budget limitations, general S-IV B, IU, and experiments on-orbit test requirements and techniques will be proposed and the alternate AEE/OCS systems configured to satisfy these general requirements. These general requirements and techniques will reflect all that is currently documented (and available) concerning these test operations and available data points.

PROGRAM PLANNING CHART

The current program plan is as follows. At the request of the project manager it has been revised from past plans to complete Phase A efforts by 15 October. Only technical manning is shown. (See next page.)

PROGRAM PLANNING

CHART



Phase A

Phase B